

# Fact Sheet-- Renewable Energy

## Off-Grid Solar Electricity

### Description

PhotoVoltaic (PV) cells consist of semi-conducting material that absorbs sunlight. The solar energy excites electrons within the material, freeing them of their atoms and allowing them to flow and create electricity.

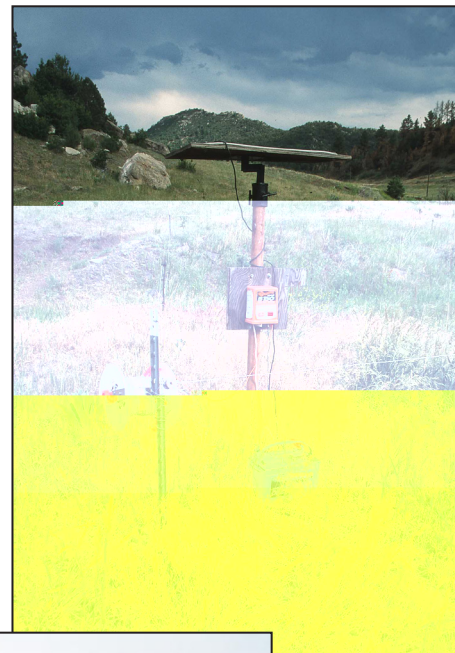
### PV in Remote Locations

Solar electric systems (PVs) are becoming more popular in remote sites where extending a line from the existing power grid may be cost-prohibitive. For this reason, pumping water for livestock and powering electric fences are popular uses.

Electric fences are typically 4-6 or 12-24 volt systems. One 2-ft square solar panel and battery storage may be sufficient to run these systems. Kits are commercially available.

One solar panel may generate up to 50 watts of power, depending on the latitude and available solar radiation on any given day. For example, more sun rays are available in Texas than Michigan, making PV systems in Texas more cost-effective.

Using PV cells to power pumps requires more planning. Remote sites have traditionally used diesel, propane, or gas engines for pumping water. To consider a solar electric conversion, one needs to calculate how many watts or horsepower (HP) are needed to run the pump.



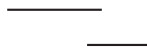
*Solar panels provide power for electric fences and livestock watering systems.*

### PV in Hybrid Power Systems

To install a PV system, you must first determine how much power is really needed. Perhaps the pumping system only uses 80 hp of a 100 hp pump. Once the power load is determined, one can compute how many solar panels it takes

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## Stirling Engine



## For More Information

For more information on solar technology or renewable energy, contact the Energy National Technology Development Team at the West National Technology Support Center in Portland, OR, Stefanie Aschmann, Team leader, 503-273-2408, [stefanie.aschmann@por.usda.gov](mailto:stefanie.aschmann@por.usda.gov).